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River rehabilitation in the Netherlands: dealing with strengths and constraints of EU-policy

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ABSTRACT: The Dutch main river system is subject to international (EU) water and nature policy: the Water Framework Directive (WFD), focussed on ecological development and restoration, and both the Bird and Habitat Directive (BHD). A large part of the Dutch main river system belongs to the Natura 2000 network, resulting from the BHD, and therefore has a special status mainly focussed on nature conservation. Besides the EU policies, there are national Dutch policies for both water and nature management.

Basic idea of the Dutch water policy is room for water. For future river discharges, technical measures alone cannot guarantee the sustainable safety of the hinterland. Preserving room for natural riverine processes is now thought to provide a better guarantee. Therefore three ministries initiated the national project 'Room for the River'. Safety and spatial quality are its main targets. The latter is likely to be enhanced by ecological restoration.

Within this political context, a combination of safety and nature should be realised by striking a balance between the strategies of conservation (BHD) and development (WFD and national policy). Therefore, a Strategic Framework was developed to implement the Bird and Habitat Directive in the Dutch river system in the context of Room for the River. This Framework contains a balance between the two targets and strategies.

KEYWORDS: water policy, nature policy, Water Framework Directive, Natura 2000, river system, ecological restoration, rehabilitation, conservation, development

Introduction

River system

Both the Dutch rivers Rhine and Meuse constitute the downstream parts of larger melt and/or rainwater fed river basins (Middelkoop & Van Haselen, 1999). In the pristine state, the inundated areas along the Rhine during floods must have been tens of kilometres wide (Van Urk & Smit, 1989). Together with the main channel floodplains formed an integrated part of the river system. Due to many modifications along both rivers in the past six centuries (at least for the Rhine it may be assumed that it retained an almost natural character until the Middle Ages) natural riverine processes of flooding, sedimentation and erosion have been greatly restrained. One of the reasons for normalisation and the building of groynes has been the great importance of both rivers for shipping traffic. Normalisation restricted the natural processes. Between years, there is little variation in frequency and duration of inundation. The gradual transition between water and land has been restricted to a fringe of floodplain along the main channel. Sedimentation of clay is concentrated to these smaller floodplains, resulting in floodplains higher than the former back swamp areas. Together with the climate change and sea level rise, the risk of flooding increased.

In the past ten years, water level in the Dutch main river system of the rivers Rhine and Meuse reached extreme heights twice. In both 1993 and 1995, the river reached such a level that there was a serious threat of flooding of the hinterland. With the changing climate, winters are expected to become wetter: more meltwater and rainwater will fill the rivers. These were reasons to look for sustainable solutions to protect the Netherlands from high water levels. Therefore, in the year 2000, the national project "Room for the River" started. Its main targets are safety and spatial quality. The study area of Room for the River includes the whole Dutch river Rhine and its main branches as well as the downstream part of the Dutch river Meuse (Figure 1).

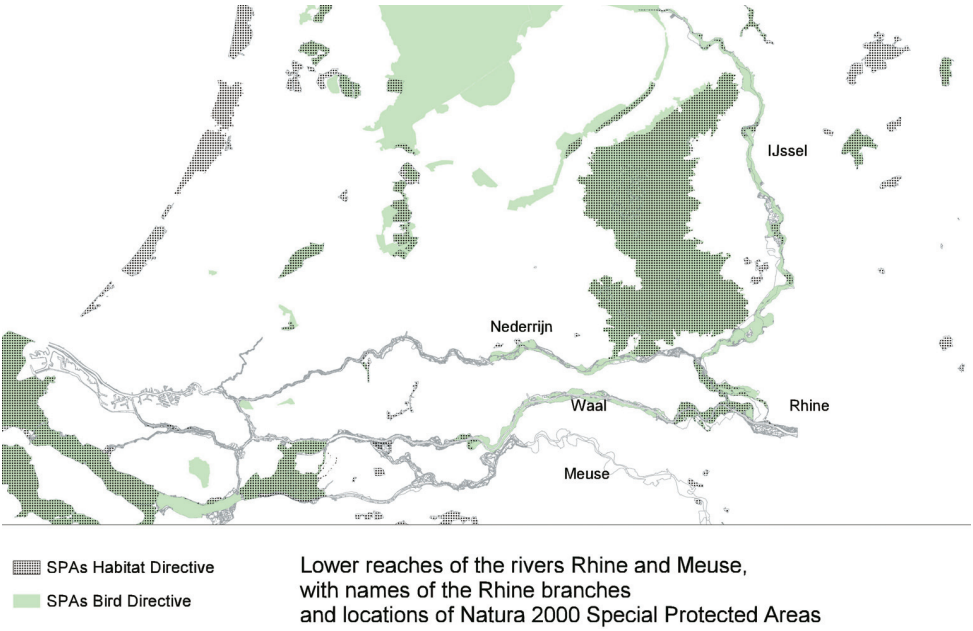

Figure 1. Study area of Room for the River as part of the Dutch stretch of Rhine and Meuse.

International (EU) and national policy for Water and Nature

On EU-scale, there are three directives that are relevant to the rivers: the Water Framework Directive (WFD) (2000), the Bird Directive (1979) and the Habitat Directive (1992) (together referred to as BHD).

The WFD aims at reaching Good Ecological Status or Potential of all water bodies in Europe by the year 2015. Each Member State is obliged to take all needed measures to obtain this state. This implies that Member States have to develop and restore the quality of their water bodies. The BHD aims at developing the Natura 2000 Network, an ecological network across all EU Member States. Each Member State is obliged to protect and preserve the present values of nature in a favourable state of conservation. Therefore, Member States have to define conservation objectives. Conservation of the values can be achieved either by means of designating protected areas or by protection of species and/ or habitats.

On the national scale, there are two main policy documents, one for water management (Ministry of Transport, 2000), and one for nature management (Ministry of Agriculture, 2000). The national water policy introduces that in case of extreme peak discharges solutions for safety should be sought in room for water. Safety solutions are combined with multifunctional spatial use of the river landscape, including nature development. The national nature policy introduces the National Ecological Network (NEN), comparable with the Natura 2000 Network. For much of the NEN-area the actual nature quality is lower than the desired one. Therefore, this nature management policy implicates nature development. Further, the nature policy aims to develop 7000 hectares of new nature along the main river system in addition to the NEN.

Implications of policy for Water and Nature for the Dutch main river system

The international and national policy mentioned above has various implications for the Dutch main river system. Over seventy percent of the floodplain area is appointed as Special Protected Area (SPA; Natura 2000 Network), where existing quality should be preserved. The complete main river system is part of the Dutch NEN, where potential quality should be developed and actual quality should be preserved.

To reach the targets of the WFD, measures to rehabilitate the river ecosystem are necessary. In the national water policy spatial solutions for safety problems are preferred above technical measures: only if spatial solutions can no longer provide the required safety level technical measures like raising dikes are approved. These spatial measures can be easily combined with nature development. Digging secondary channels, floodplain lowering and expending the floodplain area provide more room for water *and* enhance rehabilitation of river ecosystems. Thus, the national and EU water policy enforce each other in rehabilitating the river ecosystem.

The BHD aims at protecting habitats and species, characteristic for the Dutch river system, by conserving their present status on the present location. To reach the goals of the WFD, a Good Ecological Status or Potential, river ecosystems have to be developed. But, in this process, the ecological, chemical and hydrological quality have to become at least as good as needed for complying with the BHD. The WFD can enforce the BHD by reaching a better water quality.

In order to reach the safety goals for future discharges, many measures in the river area are needed. These safety measures may conflict with the conservation objectives of the BHD. The Natura 2000 Network consists of spatially defined areas with a protected status. The majority of safety measures are planned in the floodplain area, right within the actual Natura 2000-areas.

From the implications for the river system presented above and examples of how international and national policy may interact, it can be concluded that the different policy documents may enforce each other, but at the same time may work against each other.

National project "Room for the River"

In the year 2000, the national project "Room for the River" was initiated by three ministries and supported by five provinces (Bouwdienst RWS, 2002). In this national project the national policies for both water and nature are combined. Safety and spatial quality are the most important targets of Room for the River. Safety is the key factor, but spatial quality plays an important role in the decision making process. Sustainable

solutions and *anticipating long term developments characterise the approach of the project.*

The main goal of the project is to describe the measures, or combinations of measures, that are needed to ensure safety of the hinterland at a normative discharge of 16,000 m^3/sec by 2015. The maximum risk is put at once in 1250 years. Possible measures are floodplain lowering, digging secondary channels, lowering of groynes, and temporal retention of water. The approach of the project is characterised by looking for possible developments in the long term future, referred to as "no-regret policy". An Environmental Impact Assessment (EIA) evaluates possible combinations of measures and their impact on e.g. safety, spatial quality, agriculture and nature.

Creating, restoring or damaging nature values

All proposed safety measures will have impact on the present ecosystem in the floodplains. New natural values may be created and former natural values may be restored. But, both creating and restoring values may damage present favourable values. Thus, the creation of a secondary channel may turn out to be favourable for rheophilic fish (Grift 2001), but may destroy either valuable vegetations or existing isolated oxbow lakes with limnophilic fish. A more detailed description of the consequences for morphology, hydrology and ecology of measures in floodplains can be found in Wolters et al*. (2001). Pelsma* et al. *(2003) describe the advantages and disadvantages of floodplain lowering for ecology and safety.*

Since any set of safety and/ or rehabilitation measures is likely to provoke both positive and negative influences on ecological values, a Strategic Framework for the implementation of the Bird and Habitat Directive in the Dutch main river system was formulated for the support of the necessary EIA (Pelk et al.*, 2003). The approach presented here was accepted by the European Committee in February 2004.*

Strategic Framework BHD

At first sight, conflicts may arise between the policy documents described above: one aims at the conservation of nature, whereas the other rather emphasises development and/ or rehabilitation of nature. The main problem stems from the fact that both strategies are projected upon the same area. One of the problems faced by Room for the River is the possible overlap between possible measures and SPA's of the BHD.

In the Netherlands, the conservation objectives for the BHD are not yet officially formulated. This immediately brings up the problem of not knowing exactly what measures are potentially harmful and which of them are not. This was the reason to develop the Strategic Framework Bird and Habitat Directive for the river area, as a pilot. The Strategic Framework is a policy document on nature values of the Natura 2000 Network along the main branches of the river Rhine. In this document, a balance is struck between the strategies of conservation and development and main targets safety and nature.

The Netherlands, like every Member State, has several obligations in view of Natura 2000. These are: improvement of spatial connectivity, a favourable conservation status of species of flora and fauna and of habitat types (conservation objectives) and an appropriate assessment of measures and their impact (EIA). Furthermore, the Netherlands have to inform the European Committee about compensating measures and have to ask for advice concerning natural habitats and certain species that are defined as having priority in order to favour the early implementation of measures to conserve them.

In order to reach and/ or maintain the favourable conservation status, the Strategic Framework formulated the concepts of "hands off" and "be aware". The concept of "hands off" applies to the natural habitats and the habitats of the species referred to in the BHD. These habitats cover less than ten percent of the total floodplain area in Room for the River. On these locations *no* safety measures are allowed. Moreover, one has to critically assess the impact of measures outside these locations. The concept of "be aware" applies to the foraging function of floodplains for grass-eating water birds (e.g. geese, swans and Eurasian Wigeons, *Anas penelope*). In practice, this means preferably *no* measures that could damage the foraging function within these locations, *unless* key-factors (stillness, openness and availability of good quality food) are sustained or improved.

Five river sections of the river Rhine were characterised, present Natura 2000 values were listed in terms of "hands of" and "be aware" (Platteeuw *et al.*, 2004). These listings were compared with the favourable status of the Natura 2000 Network. What was left were (developmental) tasks in order to reach the favourable status. Examples of these tasks are improving and extending riparian forests, developing a more diverse river landscape, including natural gradients from wet to dry, and from low to high with natural accompanying flora and fauna.

Strategic Framework in practice: case of river branch Waal

The river branch Waal (Figure 2) is the largest, free-flowing branch of the river Rhine in the Netherlands. There is no meandering due to the presence of groynes along the river. The hydrodynamics of the Waal are rather strong, with peak discharges occurring in winter, spring and summer. Along the river there are several secondary channels and oxbow lakes. The duration of connectivity of these oxbow lakes with the main channel varies between 2-20 up to 50-150 days per year (Grift, 2001). The embanked floodplains vary little in height. As result of the embankments along the river, all sedimentation of clay takes place in the relatively narrow floodplains. Therefore the soil of the floodplains consists mostly of a thick layer of clay on sand.

Along the river branch Waal (including the Gelderse Poort) there are ten SPA's of the Habitat Directive, all are protected according to the concept of "hands off". The complete river branch Waal is SPA of the Bird Directive: eight areas within it are protected conform the concept of "hands off" (two of these overlap with two SPA's of the Habitat Directive), eleven areas conform the concept of "be aware". Box 1 shows for which habitat types and species the BHD-areas along the river branch Waal are proposed (Habitat Directive) or designated (Bird Directive).

In order to meet the objectives of the Natura 2000-values along the river branch Waal, there are several tasks to consider and carry out. The "hands off"-values should be conserved and improved, *and* one should be careful with measures in "be aware"-values: preserve the area of grassland used by grass-eating water birds and preserve the scarce high floodplains used by Corncrakes (*Crex crex*) and Corn Bunting (*Emberiza calandra*). One other important task is to develop more highly dynamic and low-lying ecosystems to sustain the pioneer vegetation on silty banks and riparian forests with European Alder (*Alnus glutinosa*) and Ash (*Fraxinus excelsior*) for both Beaver (*Castor fiber*) and breeding colonies of Great Cormorant (*Phalacrocorax carbo*). Furthermore, the connectivity with upstream and downstream areas should be improved to facilitate the migration of, for instance, the Beaver. Finally, more secondary channels should be developed in order to restore the function for fish, macro-invertebrates and fish-eating birds.

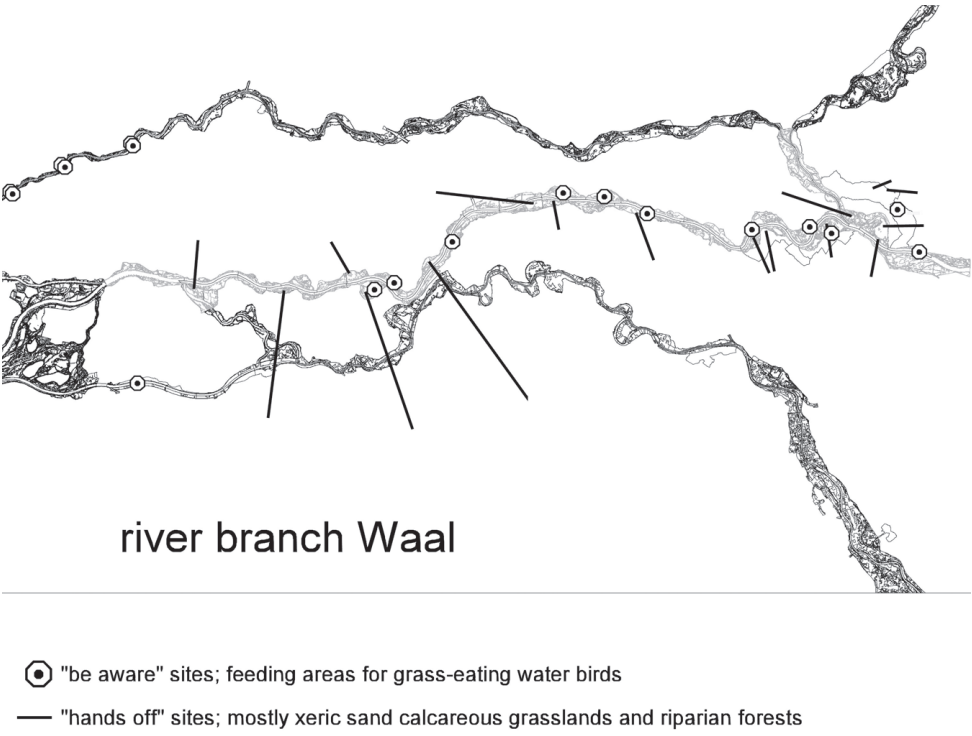

Figure 2. The river branch Waal (including the Gelderse Poort) and its "be aware" and "hands off" sites.

The present Room for the River alternatives aim at creating secondary channels, marshland, (connected) oxbow lakes, natural alluvial grassland and dynamic rough herbage. Present values, like riparian forest or xeric sand calcareous grasslands, are kept intact or are improved. Most of the proposed measures consist of at least floodplain lowering in order to create more natural grasslands and dynamic rough herbage.

Comparing the proposed measures (and their results) with the task in favour of Natura 2000-values it can be concluded that potentially the safety measures seem to support and even enhance the Natura 2000-values. True impact of measures on Natura 2000-values in "hands off"-areas, however, cannot be assessed until the preferential alternative of Room for the River, which is no more than a set of measures that are not yet spatially defined, has been designed. Only then will become clear whether measures cover "hands off"- and/ or "be aware"-areas.

An asterisk indicates a priority habitat. Numbers between brackets indicate habitat or species number according the Habitat Directive.

Habitat Directive	**Bird Directive**
Hands off	*Hands off*
Pioneer vegetation on silty banks (3270)	Qualifying habitats are the same for the Bird Directive as for the Habitat Directive
* Xeric sand calcareous grasslands with *Veronica* sp., Pincushion Flower (*Scabiosa Columbaria*) and Meadow Clary (*Salvia pratensis*) (6120) [1)]	Great Cormorant (*Phalacrocorax carbo*), breeding colonies
* Riparian forest with European Alder (*Alnus glutinosa*) and Ash (*Fraxinus excelsior*) (91E0)	Geese and Swans, nocturnal roosts
Riparian mixed forest of Pedunculate Oak (*Quercus robur*), Ash (*Fraxinus excelsior*), and Elm (*Ulmus laevis*) (91F0)	Corn Bunting (*Emberiza calandra*), breeding areas
Beaver (*Castor fiber*) (1337)	
Wheaterfish (*Misgurnus fossilis*) (1149)	
Be aware	*Be aware*
No habitats, nor species.	Feeding areas:
	Greylag Goose (*Anser anser*)
	Tundra Swan (*Cygnus columbianus bewickii*)
	White-fronted Goose (*Anser albifrons*)
	Eurasian Wigeon (*Anas penelope*)
	Breeding areas:
	Corncrakes (*Crex crex*)

Box 1. Qualifying habitats and species for river branch Waal (Platteeuw et al., 2004).

Conclusions

- Combining the strengths of international and national policy for water and nature management may lead to win-win situations: both safety and nature goals may be reached.
- The Strategic Framework BHD seems to have proved its worth as an instrument for finding a balance between conservation and development, using the concepts of “hands off” and “be aware”.
- True constraints are few (only ten percent of the total floodplain area), the concept of “hands off” applies to this area.
- Possible constraints can be tackled by the concept of “be aware”, which applies to the foraging function of floodplains for grass-eating water birds (geese, swans and Eurasian Wigeons).
- Spatial safety measures to be taken along the Dutch main river system, as part of the national project “Room for the River”, can, if well located, contribute to the conservation and improvement of Natura 2000-values along the rivers Rhine and Meuse.
- True impact of measures cannot be assessed until the preferential alternative has been designed.

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